national accelerator laboratory

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BOOSTER ENCLOSURE ACCESS CONTROL

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Introduction

This note describes the basic system of access control for the Booster which has been arrived at after discussions involving many people including members of the Booster Section, the Radiation Safety Officer, the NAL Safety Engineer, and the Director. As far as access to the booster enclosure is concerned, there will be two distinct radiation safety statuses. These are "open status" and "closed status."

The requirement for open status is that it shall be impossible to inject any beam from the linac into the booster enclosure. Specifically, this condition requires one of two situations: either

a) the linac is in open status, or

b) the beam chopper and septum magnet are both locked off and a two inch thick steel beam stop is in position in the 200 MeV diagnostic area.

The conditions for closed status are:

1) A search and secure has been completed and all entrance interlocks checked and set.

2) A continuous horn blast inside the enclosure has operated for a minimum of three minutes together with a partial extinguishing of the enclosure lights.

3) Either (a) the main ring is in closed status, or (b) bending magnets have an interlocked-setting and/or a physical beam plug is in position in the 8 GeV transport system making it impossible to inject 8 GeV protons into the main ring.

Access During Periods of Closed Status

When the Booster is in closed status, access will be limited to personnel engaged in essential operations and maintenance. Any break in the access interlock chain returns the booster to open status and requires that a search and secure be performed up to the undisturbed interlocks before operation continues. There are seven access points to the booster enclosure (Figure I). Numbers two and three at the south side of the booster will not normally be used except as emergency exits and entrances. Consequently, these will

be locked and interlocked, but for emergency use, they will be equipped with a crash-bar type of opening from the inside and a "break glass" entry facility from the outside. The remaining five entrances will be equipped with an interlocked radiation gate at the remote points from the booster (designated a) in Figure I) and a light beam system adjacent to the enclosure at the locations designated b) in Figure I.

Each radiation gate will be equipped with a sign

"Danger - High Radiation Area" ...

and a flashing red beacon. These are automatically illuminated when, and only when, the door interlock is completed. Similarly, at each light beam location in the booster enclosure there will be a visual indication that the interlock is made. The radiation gates will not be locked and access to the enclosure will be based on the following system.

Alongside each gate there will be a bank of 16 keys which form part of the hard-wire interlock system for removing the 200 MeV beam stop. Thus, removal of one of these keys prevents 200 MeV beam from reaching the booster enclosure. Every person entering the enclosure during closed status takes one of these keys and the key is held in place in an "override box" while the person passes through either a

radiation gate or through one of the light beams. Again, any one of these interlocks which is broken requires that a further search and secure be performed prior to continuing operation.

Search and Secure Procedure

Prior to the commencement of a search and secure mission, there will be short horn blasts at about one minute intervals and a dimming of the booster lights. This notifies informed people to leave the booster enclosure within the next few minutes or to get a key. Two people then perform the search and secure as follows (see Figure I).

Taking one key each they enter the radiation gate no. 1, close the gate, use a unique key on the inside to set the interlock, checking that the signs mentioned above are illuminated. They then open the door to check that the interlock is in working condition and again reset the interlock with the special key. They then enter the enclosure, setting and checking the light beam interlock at position 1-B. They then proceed counterclockwise around the enclosure setting and checking the light beam labelled 1-C. Continuing counterclockwise, and inspecting under every module, they reach stair no. 2 where one man remains by the magnet ring while

the other ascends the stair to the top door to set, check, and reset the interlock. They both continue counterclockwise repeating this procedure at stairwell no. 3 and setting the light beam across the enclosure labelled 3-C. This procedure is repeated at each access point and light beam around the enclosure. At the extraction area one man remains by the magnet ring while the other searches up to the beam plug. During the search each person encountered is checked to establish that he has a key. Anyone not holding a key must accompany the search party and leave by the next exit. Finally, the search party leaves via stair no. 1 by using their override keys.

In addition to the access control system described above, TV cameras will be installed at each of the five frequently used access points. These are not intended to be an essential part of the system but will allow spot checks to be made that each person entering the enclosure takes a key. Consideration is also being given to a refinement of the key system in which a special card or similar device would have to be inserted in the side of the key box to allow for the removal of a key. This has the advantage that only informed and responsible people would be issued with one of these cards.